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DESCRIPTION OF THE CASK MAINTENANCE FACILITY FOR EIS PURPOSES

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Management and Technical Support Services
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CONTENTS

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1. INTRODUCTION

To transport spent nuclear fuel and high-level waste to the repository, DOE would use transportation casks that met Nuclear Regulatory Commission (NRC) regulations (10 CFR Part 71). Transportation casks and associated ancillary equipment (e.g., personnel barriers, impact limiters, and certain contaminated transport vehicle equipment) must be maintained in proper condition to maintain transportation certificate of compliance (CoC) cask and carrier system operational effectiveness and safety. Therefore, DOE would need to remove the transportation casks from service periodically for maintenance and inspection. These activities would occur at a cask maintenance facility (CMF). The CMF would be the location for primary cask maintenance activities. These activities would include, but are not limited to, testing, repair, minor decontamination, and approved modifications. The CMF would also function as a primary records keeping facility required for the Civilian Radioactive Waste Management System (CRWMS) transportation cask fleet used to ship transport, aging, and disposal canisters (TADs) during the phases of the program when waste receipts at the Yucca Mountain repository are in progress.

DOE has not determined where the CMF would be located. Until a decision is made, the analysis for the RAEIS assumes that the CMF would be located within the land withdrawal area outside the Geologic Repository Operations Area (GROA). Other possible locations include along the Caliente alignment or outsource the services to a licensed facility.

2. FACILITY DESCRIPTION AND FUNCTIONS

For the Rail Alignment Environmental Impact Statement (RAEIS) purposes, the CMF is assumed to be located adjacent to the Rail Equipment Maintenance Yard. The facility would be a two-story concrete and steel building with an area of about 30,000 ft^2 (150 × 200 feet). There would be two bays for servicing casks that were uncontaminated or slightly contaminated, and two "hot" bays for servicing more heavily contaminated casks. See Figure 1 for the conceptual layout of the CMF. The outside concrete walls of the facility and the concrete walls surrounding the hot bays would be 3 to 4 feet thick. Each bay would be provided with a local High Efficiency Particulate Absorbing (HEPA) filtration system and there would also be a separate HEPA filtration system for the CMF building. Each bay would also contain a 200-ton crane and would be accessible for rail casks.

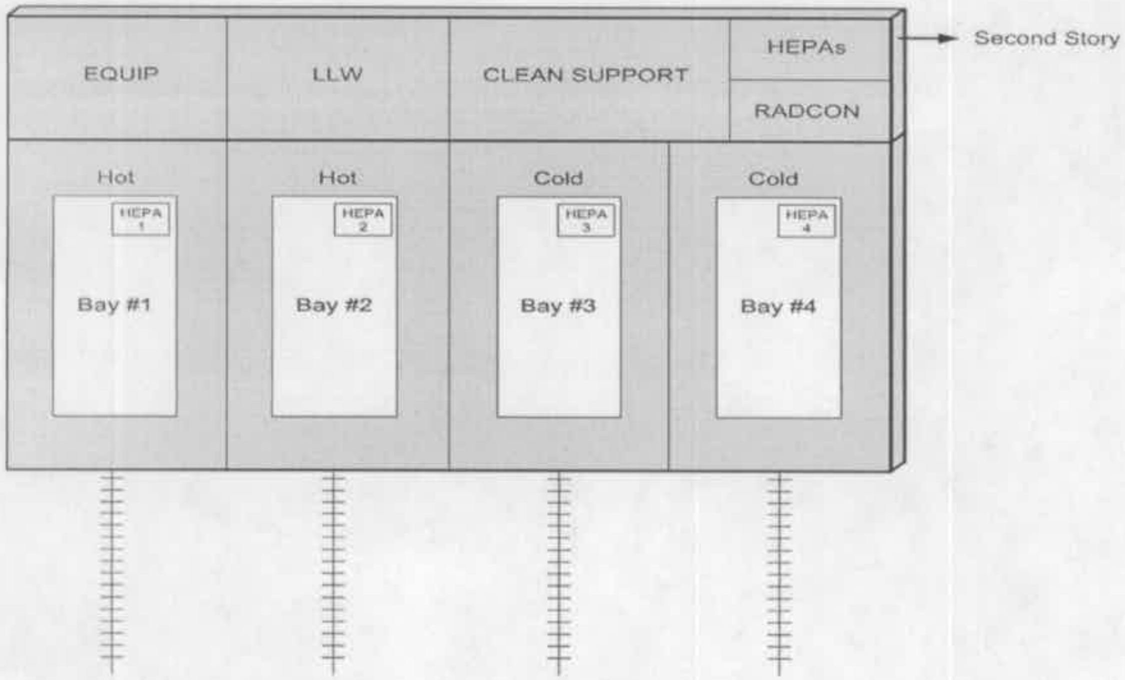

Figure 1 – Conceptual Layout of the CMF

Areas within the CMF would be radiologically controlled areas and personnel working in these areas would be monitored as per the requirements in 10 CFR 835 or 10 CFR 20. The CMF would contain a low-level radioactive waste (LLW) storage area and support areas such as locker rooms, offices, etc. The CMF would require a staff of approximately 30 people.

The dominant radioactive material handled at the CMF would be crud. Crud is the term used to describe contamination on the outside of spent nuclear fuel assemblies and would consist of the radionuclides Co-60, Mn-54, Fe-55, and Zn-65. Crud may be present in reactor spent nuclear fuel pools and may contaminate the inside of the cask during loading, even if the spent nuclear fuel has been placed in canisters.

The purpose of the CMF is to maintain rail casks used to transport dual-purpose canisters or TAD canisters. The CMF is not anticipated to be used for rail casks used to ship bare spent nuclear fuel. Therefore, the amount of contamination, i.e., crud, present in the rail casks is expected to be small. At this time, it is also anticipated that the rail casks would be vacuumed out at the repository after it was unloaded, further reducing contamination levels inside the cask.

Impacts to workers and members of the public from activities at the CMF were based on the impacts for a similar facility, the Alaron Regional Service Facility, located in Wampum, PA. This facility provides treatment, decontamination, compaction, and repackaging services for generators of radioactively contaminated materials. These services include performance of both routine and major maintenance activities on spent nuclear fuel shipping cask. These activities require the facility to have decontamination and radioactive waste treatment capabilities consistent with the anticipated radionuclide inventory and allowed by the NRC license.

Activities involving radioactive material at the Alaron facility are permitted under two separate NRC licenses. The first licenses authorize Alaron to posses, store, maintain and decontaminate equipment as well as posses sealed sources for calibration purpose. The second license allows for the receipt, possession, storage and repackaging of low specific activity (LSA) waste material, as defined in 49 CFR 173.403. Byproduct, source, and special nuclear materials on site are limited to 100 curies (Ci). Additionally, radionuclides are limited to a level below which 10 CFR 30.72 would require the preparation of an emergency plan.

For the radionuclides contained in crud, average radionuclide inventories maintained at the Alaron Regional Service Facility is about 4.7 Ci of Co-60, 0.32 Ci of Mn-54, 7.6 Ci of Fe-55, and 0.061 Ci of Zn-65 (NRC 1998, Table 3). Not all of this radionuclide inventory results from the decontamination of spent nuclear fuel casks; some of the radionuclide inventory is a result of other services provided at the Alaron Regional Service Facility. The total radionuclide inventory at Alaron is less than 2 percent of the inventory that requires the preparation of an emergency plan according to 10 CFR 30.72 (NRC 1998, Table 4). It is likely that CMF could be operated with a similar constraint on its possession of radioactive material, even if not licensed by the Nuclear Regulatory Commission.

The CMF construction activities are estimated to occur over a 21-month period. Generally, the receipt of cask shipments and associated CMF operations would occur during the same time period that repository emplacement operations are being performed. Under the current schedule, cask shipments would be from 2017 through 2046. Decontamination of the CMF is assumed to take 3 years.

Routine and minor maintenance and repair of rail casks; cask inspections and containment verification tests; minor decontamination; and record keeping would be performed at the CMF. Non-routine maintenance of the cask would be conducted elsewhere and there would be no repair of rolling stock at the CMF. It is anticipated that each cask would need to be sent to the CMF at approximately 1-year intervals for routine or minor maintenance activities. This estimated recurrence rate would be dependent on the cask CoC and actual usage.

Typical operations at the CMF could include:

- Offloading of the cask from its railcar
- Disassembly of closure hardware
- Removal and decontamination of the cask lid, shield plug, and ancillary hardware
- Survey of inside of the cask for radioactive waste
- Potential decontamination of the inside of the cask
- Visual inspection of fasteners, valves, flange faces, etc.
- Visual inspection of cask lid seating surfaces
- Change gaskets or seals
- Visual inspection of the inside and the outside of the cask
- Visual inspection of trunnions
- Visual and dimensional inspection of fasteners
- Minor repair of fasteners
- Leak testing of the cask

- Visual inspection of impact limiters

Non-routine maintenance of the cask would be conducted elsewhere and there would be no repair of rolling stock at the CMF.

3. ENVIRONMENTAL PARAMETERS

Although a design that reflects the current concept of the CMF is not available, some of the parameters that may result in an impact to the environment can be estimated from the proposed operations and size of the facility. This information is provided for land use, air quality, hydrological resources, socioeconomics, and occupational health and safety.

Land Use

Construction, operation and monitoring, and subsequent closure of a CMF would result in the disturbance of approximately 20 acres.

Air Quality

Emissions during construction and closure of a CMF would consist of air pollutants, including dust (from land clearing, site preparation, demolition, etc.) and exhaust from vehicles. No radionuclides would be released during CMF construction because no handling of casks or ancillary equipment (the source of radionuclides released) occurs during construction.

Emissions during operations would consist of both air pollutants and radionuclides. The impacts from radionuclides that would be released from CMF operations are discussed in Occupational and Public Health and Safety.

Hydrological Resources

Construction, operation and monitoring, and closure of a CMF would result in no introduction of significant or unique contaminants and would not include discharges of water to the surface. It is reasonably assumed that if a CMF were constructed within the land withdrawal area, it would be located to avoid important drainage channels and flood-prone areas and designed to ensure protection of the structure and its contents against a maximum probable flood event.

Socioeconomics

The CMF would require a staff of approximately 30 people for operations and 150 for construction. Using information provided in the Fleet Management Facility Performance Specification, the cost of constructing the facility in FY2007 dollars is estimated to be $3,600,000 and an additional cost of $ 5,250,000 for equipment.

Occupational and Public Health and Safety

As mentioned previously, operations at the CMF would be similar to the operations at the Alaron Regional Service Facility, located in Wampum, PA. This facility provides treatment, decontamination, compaction, and repackaging services for generators of radioactively contaminated materials. One of the services provided by Alaron is the decontamination of spent nuclear fuel casks. Due to the similar nature of work scope, the impacts of the Alaron Regional Service Facility were used to provide estimates of the impacts of the CMF. Because the Alaron Regional Service Facility receives casks that transport bare spent nuclear fuel and performs services in addition to the decontamination of spent nuclear fuel casks, it is assumed the impacts from the Alaron Regional Service Facility would envelope that of the CMF due to the expanded scope of services beyond decontamination of spent nuclear fuel casks used exclusively for cannistered fuel.

Radiation doses for workers at the Alaron Regional Service Facility are regulated by the NRC under 10 CFR Part 20. This regulation limits the radiation dose to workers to 5 rem per year. Like most licensed facilities, Alaron employs an administrative dose limit significantly less than the regulatory limit. Currently, Alaron limits the exposure of workers to 2 rem per year and 0.3 rem per month. Workers at Alaron were estimated to receive an individual radiation dose of 0.04 rem per month (NRC 1989, page 22). Over the course of a year, a worker would receive a radiation dose of 0.480 rem. This radiation dose was used to estimate the radiation dose to a worker at the CMF and is equivalent to a latent cancer fatality risk of 0.00029 (i.e. would increase the employee's risk of contracting cancer by 0.00029).

Based on the total number of workers at the CMF, the collective radiation dose at the CMF would be 14 person-rem per year. This is equivalent to a latent cancer fatality risk of 0.0086. Table 1 summarizes these impacts and also presents impacts for the entire duration of operations (30 years).

Table 1. Worker and Public Radiation Doses at the Cask Maintenance Facility

Exposed Person	Radiation Dose	Latent Cancer Fatalities
Annual Impacts		
Individual Worker	0.480 rem per year	0.00029
Collective Workers	14 person-rem per year	0.0086
Individual Member of the Public	2.0E-9 rem per year	1.2E-12
Collective Members of the Public	0.00023 person-rem per year	1.4E-7
Impacts Over 30 Years		
Individual Worker	14 rem	0.0086
Collective Workers	430 person-rem	0.26
Individual Member of the Public	6.0E-8 rem	3.6E-11
Collective Members of the Public	0.0070 person-rem	4.2E-6

The Alaron Regional Service Facility, the maximally exposed member of the public was located 300 meters from the facility. The estimated radiation dose for this individual from emissions through all environmental pathways was estimated to be 2.0E-9 rem per year (NRC 1989, page 22). This radiation dose is equivalent to a latent cancer fatality risk of 1.2E-12.

The total population within 84 kilometers of the CMF is estimated to be about 118,000 people in the year 2067. If all of these people were exposed at the same level as the maximally exposed member of the public, the resulting collective radiation dose would be 0.00023 person-rem per year. This collective radiation dose is equivalent to a latent cancer fatality risk of 1.4E-7. Table 1 summarizes these impacts and also presents impacts for the entire duration of operations (30 years).

Accidents

Accidents at the Alaron Regional Service Facility were evaluated by the NRC (1989, Section 7). A fire at the Alaron Regional Service Facility was estimated to result in an exposure of 0.00045 rem to a member of the public at a distance of 50 meters from the facility and an exposure of 0.000011 rem to a member of the public at a distance of 300 meters from the facility. These radiation doses are equivalent to a latent cancer fatality risk of 2.7E-7 and 6.5E-9, respectively.

The total population within 84 kilometers of the CMF is estimated to be about 118,000 people in the year 2067. If all of these people were exposed at the same level as the member of the public located 300 meters from the facility, the resulting collective radiation dose would be 1.3 person-rem. This collective radiation dose is equivalent to a latent cancer fatality risk of 7.6E-4.

Wastes

Locating, operating, and decommissioning the CMF would result in the generation of construction and demolition debris, hazardous wastes, sanitary and industrial solids, sanitary sewage, and low-level radioactive wastes. The volumes of wastes are listed in Table 2. These volumes are based on the volumes presented in Jason (2001) and in NRC (1989). For low-level radioactive waste, a range in waste volumes was estimated. The upper end of the range is from Jason (2001). The lower end of the range is based on the volume of contaminated metal waste from NRC (1989). This small amount of Class A low-level radioactive waste would be packaged and stored in a low-level radioactive waste storage area until shipped and disposed.

Table 2. Cask Maintenance Facility Total Waste Volumes

Waste Type	Volume
Construction and demolition debris	2,300 cubic meters
Hazardous wastes	170 cubic meters
Sanitary and industrial solids	4,200 cubic meters
Sanitary sewage	21 million liters
Low-level waste	3,200-7,900 cubic meters
Note: Waste volumes include construction, operations, decontamination, and closure. Operations period is assumed to be 30 years.	

Power Usage

Estimated electricity necessary for the operation of the CMF would be less than 2 megawatts.

4. REFERENCES

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